

Distributional Records for Terrestrial and Freshwater Mollusca of the Cascade and Coast Ranges, Oregon¹

by

BRANLEY ALLAN BRANSON AND ROGERS MACGOWAN BRANSON

Department of Biological Sciences, Eastern Kentucky University, Richmond, Kentucky 40475

Abstract. Visitation of 125 Cascade and Coast mountain sites in Oregon during the summer of 1981 yielded records for 15 families, 29 genera, and 45 species of terrestrial and freshwater mollusks. *Pisidium insigne*, *Arion hortensis*, *Prophysaon foliolatum*, and *P. fasciatum* are reported for the first time in Oregon, an undescribed species of *Hesperarion* is discussed, and *Trilobopsis loricata nortensis* is reported in Oregon for the first time since 1897.

INTRODUCTION

THE COAST AND CASCADE mountain ranges divide the state of Oregon into two distinctive molluscan provinces, a lush, moist and narrow western one (west of the Cascade Crest) and a much wider, arid eastern one on the lee side of the Cascade Crest. This general picture partially breaks down along the Columbia River Gorge (DETILING, 1966; LAWRENCE, 1939; LYNOTT, 1966) because Pacific coastal vegetation extends eastward farther than otherwise possible, permitting several species of land snails to extend their ranges eastward a few kilometers along the river. For the most part, however, the bulk of the Oregonian land-snail fauna occurs west of the mountains. The Columbia River itself also acts as a partial barrier, both to dispersal and to genetic mingling. For example, in Washington, *i.e.*, on the north side of the river, *Oreohelix* extends westward along the Columbia River (B. A. BRANSON, 1977), whereas extensive searching on the south side of the river has failed to disclose specimens.

Another relatively distinct botanical, and hence molluscan, region is the southwestern corner of Oregon. In this area, northern Californian vegetation, including coastal redwoods and tanoak, extends into Oregon, creating a habitat that allows certain terrestrial mollusks to extend their ranges northward for a short distance along the coast.

This article reports the results of field work conducted in the Oregon components of the Coast and Cascade ranges during the summer of 1981. It is an extension of work commenced in Washington (B. A. BRANSON, 1977, 1980). About 125 stations were visited in Oregon, although only 82 of these yielded molluscan specimens (see below). The only previous systematic survey of Oregon terrestrial and

freshwater mollusks is that of HENDERSON (1929, 1936), many of his records being reiterated by PILSBRY (1939, 1940, 1946, 1948).

LOCALITIES AND HABITATS

Much of the forest in the Coast Range has been repeatedly and severely slashed and burned, creating very poor molluscan habitats. Our work in these areas resulted principally in negative results. Likewise, practically none of our collecting stations east of the Cascade Crest yielded specimens. There is very little organic soil in that vast region, most of the substrate being of volcanic origin and very dry and porous. Lodgepole and ponderosa pines and other drought-resistant plants are the typical vegetation. Although we did not obtain mollusks at any of them, the following sites are of interest because of biogeographical importance, demonstrating the strong rain-shadow influence of the mountains: 8 sites along Oregon State Route 242 in McKenzie Pass, all in extremely dry, black, unconsolidated lava; 6 sites along Century Drive, a 160-km loop drive west of Bend, up to 1524 m elevation, mostly in insect-devastated lodgepole pines; 6 sites at Paulina Peak, a collapsed volcanic caldera southeast of Bend, mostly in dry lava and pine forests; 8 sites along Oregon State Route 58 east of the Cascade Crest, mostly in dry lava and lodgepole pines; 5 sites around Diamond Lake north of Crater Lake, mostly in dry lava and lodgepole pines; and 10 sites equally distributed on Mount Mazama (Crater Lake National Park) from crest to foot, all in dry lava and pines.

The winter and summer of 1980-1981 were among the driest recorded (U.S. Weather Bureau, Portland, personal communication). This doubtless played a role in reducing our success in mollusk collecting. However, dead shells

¹ Supported by an Eastern Kentucky University Faculty Grant.

were not found in the localities delineated above, forcing the conclusion that the Cascade Crest barrier is a real one.

The sites at which we successfully secured specimens follow. The sites are numbered consecutively, and, in the annotated list, specimens are referred to the sites from which they were collected by these numbers. The figures in parentheses represent the number of specimens secured. The combination of letters and numbers given at each collecting station below, *i.e.*, R 23 E, T 35 S, S 31, are map coordinates obtained from county maps.

1. Chandler Wayside State Park and vicinity of Crooked Creek, U.S. Route 395, R 23 E, T 35 S, S 31, Lake County; 1375 m elevation; western juniper, ponderosa pine, sparse undergrowth, dry lava substrate; 7 June 1981.
2. Grizzly Peak, Fremont National Forest, 9.6 km east of SR 140 via Forestry Road 387, R 12 E, T 38 S, S 7, Lake County; 1890 m elevation; Douglas fir, spruce, aspen, pines, grass; light rain; rocks, soil, lava; 7 June 1981.
3. Grasshopper Flat, Fremont National Forest, 3.2 km via SR 140 west of junction with Forestry Road 387, R 17 E, T 38 S, S 17, Lake County; 1516 m elevation; dry volcanic soil, pines, firs; 8 June 1981.
4. Bly Mountain Pass, Winema National Forest, 16 km north of Bonanza, SR 140, R 11 E, T 37 S, S 22, Klamath County; 1494 m elevation; dry volcanic soil, pine forest with evidence of an old burn; 8 June 1981.
5. Spence Mountain near Upper Klamath Lake, 13.6 km northwest of Klamath Falls, SR 140, R 7 E, T 37 S, S 23, Klamath County; 1391 m elevation; dry pine forest; 8 June 1981.
6. Near Shake Camp Spring, Rogue River National Forest, SR 140, 14.5 km west of Aspen Point, R 3 E, T 37 S, S 5, Jackson County; 1303 m elevation; spruce-fir forest, low undergrowth and ferns; 8 June 1981.
7. North Fork of Little Butte Creek and vicinity, SR 140, R 2 E, T 36 S, S 27, Jackson County; 571 m elevation; soil, marginal oak forest; 8 June 1981.
8. Coast Range, Siskiyou National Forest, 1.6 km northwest of U.S. Route 199, R 8 W, T 37 S, S 13, Josephine County; 457 m elevation; standing and downed oak trees, leaf litter; 9 June 1981.
9. Coast Range, Siskiyou National Forest, U.S. Route 199 at California border, R 9 W, T 41 S, S 14, Josephine County; 366 m elevation; firs, salal, moss, rotting wood; 9 June 1981.
10. Coast Range, 1.2 km northeast of Brookings via North Bank Road, R 12 W, T 39 S, S 23, Curry County; 34 m elevation; below burned over hill along Chetco River, bigleaf maple, ferns, alder, salmonberry, Oregon myrtle (*Umbellularia californica*); 10 June 1981.
11. Coast Range, Siskiyou National Forest, 0.4 km northeast of Loeb State Park, R 12 W, T 39 S, S 30, Curry County; 34 m elevation; coastal redwood, bigleaf maple, tanoak, alder, fir, ferns, huckleberry, Oregon myrtle; 10 June 1981.
12. Low hillside, 1.9 km east of U.S. Route 101, Cape Sebastian Overlook, R 14 W, T 37 S, S 31, Curry County; 230 m elevation; tanoak, Oregon myrtle, fir, ferns, grass; 10 June 1981.
13. Humbug Mountain State Park, Siskiyou National Forest, R 15 W, T 23 S, S 25, Curry County; 49 m elevation; bigleaf maple, Douglas fir, tanoak, fir, ferns, moss; 11 June 1981.
14. Humbug Mountain State Park, Siskiyou National Forest, R 15 W, T 33 S, S 25, Curry County; 183 m elevation, other conditions as at Station 13; 12 June 1981.
15. Humbug Mountain State Park, Siskiyou National Forest, R 15 W, T 33, S 25, Curry County; 365 m elevation; other conditions as at Station 13; 12 June 1981.
16. Humbug Mountain State Park, Siskiyou National Forest, R 15 W, T 33 S, S 25, Curry County; 535 m elevation; other conditions as at Station 13; 12 June 1981.
17. Steep bluffs of the Middle Fork of the Coquille River and in the river, 16 km east of Myrtle Point via SR 42, Coos County; bigleaf maple, spruce, fir; 305 m elevation; 13 June 1981.
18. Bear Creek Recreation Area on Middle Fork of the Coquille River and in the river, 43 km east of Myrtle Point via SR 42, Douglas County; 396 m elevation; Douglas fir, spruce; 13 June 1981.
19. Cape Arago at Sunset Bay, near sea level, Coos County; Sitka spruce, skunk cabbage, salmonberry, ferns; 13 June 1981.
20. Honeyman State Park, R 21 W, T 19 S, S 13, Lane County; sea level; Sitka spruce, salal, bigleaf maple, wax myrtle, alder; 14 June 1981.
21. Siuslaw National Forest, 4.8 km east of Florence via Canary Road, R 10 W, T 19 S, S 7, Lane County; 304 m elevation; alder, ferns, decaying wood, skunk cabbage; 14 June 1981.
22. Siuslaw National Forest, 13 km east of Florence via SR 126, along Siuslaw River, R 10 W, T 18 S, S 7, Lane County; 260 m elevation; Douglas fir, bigleaf maple, skunk cabbage, decaying wood; 15 June 1981.
23. Siuslaw National Forest, 24 km east of Florence via SR 126, along Siuslaw River, R 9 W, T 18 S, S 6, Lane County; 304 m elevation; Douglas fir, spruce, decaying wood; 15 June 1981.
24. Sea Lion Caves, R 11 W, T 16 S, S 3, Lane County; 213 m elevation; rocks, salal; 15 June 1981.
25. Cape Perpetua, Siuslaw National Forest campground along Cape Creek and in creek, R 11 W, T 15 S, S 2, Lane County; 183 m elevation; bigleaf maple, Sitka spruce, alder, ferns, moss; 16 June 1981.
26. Cape Perpetua, Siuslaw National Forest Auto Loop Trail, near summit, R 11 W, T 15 S, S 2, Lane County; 472 m elevation; Sitka spruce, may apple, salal, ferns, moss; 16 June 1981.
27. Cape Perpetua, near the terminus of the Siuslaw National Forest Auto Loop Trail, R 11 W, T 15 S, S 2, Lane County; 670 m elevation; spruce, alder, salal, ferns, litter; 16 June 1981.
28. Cape Perpetua, "Devil's Churn," Siuslaw National Forest, R 11 W, T 15 S, S 2; 121 m elevation; Sitka spruce, salal; 16 June 1981.
29. Siuslaw National Forest along Alsea River, approximately 2.4 km east of Tidewater, via SR 34, R 10 W, T 13 S, S 20, Lincoln County; 290 m elevation; bigleaf maple, fir, spruce, ferns, moss, alder; 17 June 1981.
30. Clear-cut forest, 17.7 km southwest of Corvallis, via SR 34, R 7 W, T 13 S, S 1, Benton County; 375 m elevation; young Douglas fir and a few grasses; 17 June 1981.
31. South Beach State Park, R 11 W, T 11 S, S 19, 3.2 km south of Newport, Lincoln County; 61 m elevation; salal, rhododendron; 19 June 1981.
32. Devil's Lake State Park, Devil's Lake, R 11 W, T 6 S, S 35, and in Devil's River, Lincoln County; 64 m elevation; Douglas fir, spruce, salal, ferns, skunk cabbage; 20 June 1981.
33. Swampy area, 1.8 km east of Lincoln City via West Devil's Lake Road, Lincoln County; Sitka spruce, ferns, skunk cabbage, decaying wood; 20 June 1981.
34. Cascade Head Experimental Forest, 4.0 km northeast of

- Otis, R 10 W, T 6 S, S 14, Tillamook County; 335 m elevation; Douglas fir, Sitka spruce, ferns, alder, moss, decaying wood, evidence of an old fire; 21 June 1981.
35. Neskowin Bay area, R 11 W, S 13, Tillamook County; 36.5 m elevation; grasses and sedges; 21 June 1981.
 36. Cape Lookout State Park, R 10 W, T 2 S, S 6, Tillamook County; dead wood, Sitka spruce, skunk cabbage, ferns; 21 June 1981.
 37. Jones Creek Forest Camp, 35 km east of Tillamook via SR 6, Tillamook County; 305 m elevation; clear-cut and burned area, young Douglas fir; 22 June 1981.
 38. Crest of Cape Lookout, R 10 W, T 2 S, Tillamook County; 365 m elevation; decaying wood, Sitka spruce, moss, ferns; 22 June 1981.
 39. Short Beach Trail, Oswald West State Park, Clatsop County; 152 m elevation; undisturbed Sitka spruce forest, western redcedar, hemlock, ferns, moss; 23 June 1981.
 40. Ecola State Park, Clatsop County; 183 m elevation; disturbed Sitka spruce forest; 24 June 1981.
 41. Fort Stevens State Park, Clatsop County; hardwoods, salal, moss, ferns, Sitka spruce, alder; 24 June 1981.
 42. Bradley Wayside, Clatsop State Forest, 6.4 km west of Westport, old U.S. Route 30, Clatsop County; 180 m elevation; wood sorrel, ferns, Douglas fir, decaying wood; 25 June 1981.
 43. Low bluffs, 3.4 km west of Portland via U.S. Route 30, Columbia County; 107 m elevation; volcanic rocks; 25 June 1981.
 44. Latourell Falls and Latourell Creek, R 5 E, T 1 N, S 29, Multnomah County; 61 m elevation; bigleaf maple, firs, moss, volcanic rocks; 27 June 1981.
 45. Wakkeena Falls and Creek, R 6 E, T 1 N, S 9, Multnomah County; vegetation and edaphic conditions as at Station 44; 27 June 1981.
 46. Horsetail Falls and Creek, R 6 E, T 1 N, S 9, Multnomah County; vegetation and edaphic conditions as at Station 44; 27 June 1981.
 47. Ainsworth State Park, R 6 E, T 1 N, S 3, Multnomah County; pines, firs, bigleaf maple, alder, ferns, moss, volcanic rocks and soil; 27 June 1981.
 48. Starvation Creek near Lancaster Falls, R 9 E, T 1 N, S 4, Multnomah County; 33 m elevation; very dry volcanic soil and rocks, pines, few alders along the creek; 28 June 1981.
 49. Dry volcanic slope, 1.6 km below Mayer Roadside via Interstate 80N, R 12 E, T 2 N, S 11, Hood River County; 189 m elevation; ponderosa pine and volcanic rocks; 28 June 1981.
 50. Mount Hood National Forest, Robinhood Campground, R 10 E, T 3 S, S 5, Hood River County; 1082 m elevation; fir, pine, ferns, skunk cabbage; 28 June 1981.
 51. Mount Hood, Mount Hood National Forest, 1.6 km above Government Camp via Timberline Road, R 9 E, T 3 S, S 13, Clackamas County; 1372 m elevation; subalpine fir forest; 30 June 1981.
 52. Mount Hood, Mount Hood National Forest, 4.8 km above Government Camp via Timberline Road, R 8 E, T 3 S, S 18, Clackamas County; 1524 m elevation; subalpine fir forest; 30 June 1981.
 53. Still Creek Campground, Mount Hood National Forest, just off U.S. Route 26 on Forestry Road S 32, R 9 E, T 3 S, S 18, Clackamas County; 1067 m elevation; pine, fir, ferns, moss; 30 June 1981.
 54. Old clear cut at Blue Box Pass, U.S. Route 26, R 9 E, T 4 S, S 20, Wasco County; 1227 m elevation; fir, spruce, much decaying wood; 1 July 1981.
 55. Along Clear Fork of Sandy River, Mount Hood National Forest Road N 12, R 8 E, T 2 S, S 4, Clackamas County; 1042 m elevation; alder, penstemon, mountain mahogany, fir, pine, very dry; 1 July 1981.
 56. Along Hood River just outside Mount Hood National Forest, Forestry Road N 18, R 9 E, T 1 N, S 31, Multnomah County; 613 m elevation; pine, Douglas fir, oak, grass, very dry; 2 July 1981.
 57. Along Hood River, 1.6 km downstream from Station 56, Forestry Road N 18, R 9 E, T 1 N, S 31, Multnomah County; 549 m elevation; alder, bigleaf maple, Douglas fir, ferns, decaying logs; 2 July 1981.
 58. Along Clackamas River, 4.0 km southwest of Ripplebrook Ranger Station via SR 224, R 6 E, T 5 S, S 27, Clackamas County; 488 m elevation; Douglas fir, ferns, decaying wood; 3 July 1981.
 59. Near Clackamas River, 3.2 km southwest of Ripplebrook Ranger Station, SR 224, R 6 E, T 5 S, S 34, Clackamas County; 457 m elevation; dense shade, Douglas fir, ferns, decaying logs; 3 July 1981.
 60. Roaring River, SR 224, R 6 E, T 5 S, S 7, Clackamas County; 304 m elevation; scouring rushes, decaying logs; 3 July 1981.
 61. Near McNeil Forest Camp, Mount Hood National Forest, 6.4 km north of Zig Zag via Forest Road N 12, R 7½ E, T 2 S, S 9, Clackamas County; 496 m elevation; floodplain, decaying logs; 3 July 1981.
 62. Mount Hood Wilderness Area, Mount Hood National Forest, 16 air km northeast of Zig Zag via Ramona Falls Trail, R 8 E, T 2 S, S 24, Clackamas County; 1219 m elevation; Douglas fir, redcedar, moss, ferns, decaying logs; 4 July 1981.
 63. Whispering Falls, R 7 E, T 10 S, S 19, Willamette National Forest, Marion County; 610 m elevation; Douglas fir, hemlock, redcedar, ferns, moss, decaying wood; 5 July 1981.
 64. Lost Prairie, U.S. Route 20, R 6 E, T 13 S, S 34, Linn County; 1013 m elevation; fir-spruce forest; 5 July 1981.
 65. Tombstone Pass summit, U.S. Route 20, R 6 E, T 13 S, S 31, Linn County; 1291 m elevation; fir-spruce forest, decaying logs, heavy snow cover; 5 July 1981.
 66. Banks of Tumalo Creek, Tumalo State Park near Bend, R 10 E, T 18 S, S 8, Deschutes County; 977 m elevation; willows, rank undergrowth, grass, volcanic soil; 7 July 1981.
 67. North boundary of Three Sisters Wilderness, SR 242, R 7 E, T 15 S, S 34, Lane County; 1493 m elevation; firs, grass, decaying logs, rocks; 8 July 1981.
 68. Dead Horse Grade, north boundary of Three Sisters Wilderness, SR 242, R 7 E, T 15 S, S 7, Lane County; 1189 m elevation; Douglas fir, spruce, decaying wood, grass; 8 July 1981.
 69. Proxy Falls, Three Sisters Wilderness, R 7 E, T 16 S, S 23, Lane County; 975 m elevation; Douglas fir, vine maple, redcedar, decaying logs; 8 July 1981.
 70. Northwest boundary of the Mount Washington Wilderness, off Forestry Road 2664, Willamette National Forest, R 5 E, T 14 S, S 33, Linn County; 1069 m elevation; lava, Douglas fir, shrubs; 8 July 1981.
 71. Salt Creek Falls, SR 58, Willamette National Forest, R 5½ E, T 22 S, S 33, Lane County; 1234 m elevation; redcedar, ferns, Douglas fir, maple, decaying wood; 11 July 1981.
 72. Montieth Rock area, SR 58, Willamette National Forest, R 4 E, T 21 S, S 27, Lane County; 670 m elevation; alder, Douglas fir, maple, redcedar, decaying wood; 11 July 1981.
 73. West bank of Hills Creek Lake, R 3 E, T 22 S, S 10, Lane County; 472 m elevation; redcedar, fir, ferns, moss, oak, Pacific madrone; 11 July 1981.

74. North bank of Willamette River between Sacandaga and Indigo Springs, R 4 E, T 24 S, S 11, Forestry Road 21, Willamette National Forest, Lane County; 792 m elevation; redcedar, hemlock, Douglas fir, alder, maple, logging debris, volcanic soil; 12 July 1981.
75. Near southwestern corner of Diamond Peak Wilderness at end of Willamette National Forest Road 393 (off Forestry Road 2154), 9.6 km above Emigrant Creek crossing, R 5 E, T 24 S, S 35, Lane County; 1372 m elevation; volcanic soil and rocks, Douglas fir, white pine; 12 July 1981.
76. Emigrant Creek crossing of Willamette National Forest Road 21, R 5 E, T 24 S, S 21, Lane County; 1115 m elevation; Douglas fir, white pine, alder, maple, decaying wood; 12 July 1981.
77. Fall Creek Reservoir, R 1 W, T 19 S, Willamette National Forest, Lane County; 335 m elevation; 12 July 1981.
78. Suzan Creek State Park, SR 138, banks of Umpqua River, R 2 W, T 26 S, S 24, Douglas County; 285 m elevation; Douglas fir, redcedar, alder, maple, oak; 13 July 1981.
79. Eagle Rock, banks of Umpqua River, SR 138, R 2 E, T 25½ S, S 23, Douglas County; Douglas fir, cedar, alder, maple; 14 July 1981.
80. White Horse Falls, SR 138, R 4 E, T 27 S, S 2, Douglas County; 1156 m elevation; white pine, Douglas fir, rocks; 14 July 1981.
81. Natural Bridge on Rogue River, Rogue River National Forest Road 300, R 3 E, T 31 S, S 16, Jackson County; 954 m elevation; Douglas fir, sugar pine, dry moss; 17 July 1981.
82. Three Horn Camp, Umpqua National Forest, SR 227, R 2 W, T 32 S, S 12, Douglas County; 790 m elevation; Douglas fir, sugar pine, Oregon grapes; 17 July 1981.

ANNOTATED LIST OF TAXA

In the list that follows, specimens are referred to collecting sites by station number, and the number of individuals collected at each site is given in parentheses. Unless otherwise noted, all specimens are in the Eastern Kentucky University Museum of Zoology (EKU).

BIVALVIA

SCHIZODONTA

UNIONIDAE

Margaritifera margaritifera falcata (Gould, 1850)

Collections: 17 (2), 23 (2).

Thriving populations of this bivalve were observed in the Middle Fork of the Coquille River and the Siuslaw River, but only four mature specimens were retained for the ECU museum, all with purple nacre. A representative measured 62.0 mm in length and 31.5 mm in greatest depth.

HENDERSON (1929) reported this mussel as common in many Oregon rivers, and HAAS (1954) took several specimens from the Rogue River at Grant's Pass, Josephine County.

Gonidea angulata (Lea, 1838)

Collections: 17 (4).

Four specimens from the Middle Fork of the Coquille

River (Station 17) were retained for the ECU museum. The species was previously reported from the Umpqua and Silvies rivers (HENDERSON, 1929), the Rogue (HAAS, 1954), and the Walla Walla (COOPER, 1860).

HETERODONTA

SPHAERIIDAE

Sphaerium patella (Gould, 1850)

Collections: 17 (2).

This is one of the most widespread sphaeriids in the Pacific northwest. HENDERSON (1929) reported the species from several Oregon rivers and creeks.

Psidium insigne Gabb, 1868

Collections: 32 (2).

These specimens, found on the muck bottom of Short Creek running out of Devil's Lake State Park, seem to fit the characteristics of this species better than any other. *Psidium insigne* has not been previously reported from Oregon.

GASTROPODA

MESOGASTROPODA

PLEUROCERIDAE

Most of the distributional knowledge of this family in the Pacific Northwest is based upon the papers of HENDERSON (1929, 1935a, b, 1936), B. A. BRANSON (1977, 1980), and B. A. BRANSON & BARRETT (1980). In the last-cited paper, we discussed the possibility that GOODRICH (1942) was hasty in relegating HENDERSON's (1935a, b) species to the synonymy of *Goniobasis silicula* and *G. plicifera*. Recently, BURCH (1982) and BURCH & TOTTENHAM (1980) have elected to resurrect the generic designation *Juga* to include all the western U.S. pleurocerids, a name that is probably more in keeping with the concept of subgenus. The nomenclatural problems associated with the family Pleuroceridae should be referred to the International Zoological Commission for decisions under the plenary powers. The strict application of all the changes recommended by BURCH (1982) and others would result in much confusion. Therefore, we elect to utilize the better known and more familiar designations of Goodrich.

Goniobasis (Juga) coquillensis Goodrich, 1935

Collections: 17 (2), 18 (24).

From both sites, the specimens bear two to three rather broad, purplish revolving bands, most obviously on the body whorl and within the aperture. Otherwise, the basic shell coloration is dark brown to mahogany. The sculpturing, spiral and axial, is very well developed. Most of the apices have been eroded, only 4 to 5½ whorls remaining. A sample of 9 shells averaged 17.9 mm (15.5–21.0 mm) in height and 7.9 mm (7.0–9.0 mm) in greatest diameter.

Goniobasis (Juga) hemphilli dallesensis Henderson, 1935

Collections: 13 (2), 44 (4), 46 (4).

The specimens from Station 13, a small, clear creek at the base of Humbug Mountain, are far out of range for this race, but their characteristics are nearly identical to those presented by HENDERSON (1935a, b), as confirmed by comparison with topotypes. The spiral sculpture is very faintly developed, whereas the remainder of the shell is nearly smooth. There are two or three purplish bands on the body whorl.

Goniobasis yrekaensis Henderson, 1935

Collections: 7 (27).

These dark mahogany-brown, slender shells are heavily sculptured with radial and spiral lines, top to bottom. A sample of 5 shells averaged 16.3 mm (15.0–17.5 mm) in length, 6.7 mm (6.5–7.0 mm) in width, and had apertures that averaged 6.9 mm (6.6–7.1 mm) by 4.5 mm. The population in this stream is very large.

Goniobasis (Juga) silicula (Gould, 1847)

Collections: 25 (7), 77 (13).

All specimens were more or less typical in coloration and sculpturing except for moderate banding at Station 25.

HYDROBIIDAE

The generic designation utilized herein is that of TAYLOR (1966). BURCH (1982) utilized *Fluminicola*, as have many other former authors.

Lithoglyphus virens (Lea, 1839)

Collections: 17 (2).

BASOMMATOPHORA

ANCYLOPLANORBIDAE

The family and generic designations used herein are those of HUBENDICK (1978).

Planorbula (Menetus) opercularis (Gould, 1847)

Collections: 32 (2).

This is the dominant mollusk in the discharge creek at Devil's Lake.

PHYSIDAE

HENDERSON (1929, 1936) presented many records for physid snails in Oregon but little has appeared in the literature since then. BURCH (1982) and BURCH & TOTTENHAM (1980) use the generic epithet *Physella* rather than *Physa*.

Physa gyrina ampullacea Gould, 1855

Collections: 7 (1), 32 (2).

BURCH (1982) and BURCH & TOTTENHAM (1980) reduced *P. ampullacea* to subspecific status.

Physa traski (Lea, 1864)

Collections: 1 (1).

A single specimen was retained for the record. However, the Crooked Creek population is a very large one. No other mollusks were observed in the stream.

CARYCHIIDAE

Carychium occidentale Pilsbry, 1891

Collections: 17 (2), 29 (8), 47 (3), 77 (10).

Practically all these specimens were removed from hardwood leaf litter. PILSBRY (1948) reported specimens from Portland and Multnomah, Clackamas and Clatsop counties, and HENDERSON (1929) took specimens from Springfield Junction and reported (1936) upon specimens at Stanford University from Astoria, Salem, and Portland. A sample of seven individuals averaged 2.1 mm (2.0–2.2 mm) in length, 0.96 mm (0.8–1.0 mm) in greatest diameter, and 5½ (5¼–5½) whorls.

STYLOMMATOPHORA

HELMINTHOGLYPTIDAE

Monadonia fidelis (Gray, 1834)

Collections: 8 (4), 10 (5), 11 (4), 13 (1), 15 (5), 16 (1), 17 (16), 18 (1), 19 (1), 23 (1), 44 (1), 48 (1), 49 (3), 73 (2), 74 (2), 77 (1), 78 (5), 81 (1), 82 (1).

The Columbia River gorge interrupts the Cascade Crest weather barrier, allowing rain clouds to sweep moisture-laden air masses farther inland than would be possible otherwise, creating gradations of plant life (DETLING, 1966; LAWRENCE, 1939; LYNOTT, 1966). There is a corresponding color and banding variation in *M. fidelis* populations distributed along the gorge (R. M. BRANSON, 1983). The climatic amelioration, of course, allows this and other species of snails and slugs to penetrate considerably farther inland than elsewhere in the Cascade Mountain region.

Representative average measurements of adult shells (*i.e.*, with reflected peristomes fully formed) from the principal biotopes follow: coastal (N = 16)—diameter: 31.7 mm (20.2–41.1 mm); height: 25.9 mm (18.0–39.0 mm); whorls: 6+ (5½–6¾); Columbia River gorge (N = 2)—diameter: 30.8 mm (28.2–33.5 mm); height: 19.2 mm (16.5–22.0 mm); whorls: 5½–6¾; upland sites (N = 6)—diameter: 30.3 mm (23.5–34.5 mm); height: 19.8 mm (14.6–24.0 mm); whorls: 6½ (5¾–6¾). The largest specimens were obtained from extreme southwestern Oregon (vicinity of Harris Beach and Loeb State Park). However, the coastal shells tend to have higher spires (Diameter/Height ratio averages 1.4) than those from Columbia River gorge or upland sites (D/H ratio averages 1.55).

Additional Oregon distribution records may be found in PILSBRY (1939), HENDERSON (1929, 1936), HAAS (1954), WALTON (1970), and ROTH (1981).

POLYGYRIDAE

Triodopsis germana (Gould, 1851)

Collections: 7 (5), 13 (1), 23 (1), 29 (1), 36 (1), 42 (1), 77 (1), 78 (8).

The specimens from Jackson County (Station 7) are sparsely hirsute and, in general, match the diagnosis of *T. germana vancouverinsulae* (Pilsbry & Cooke, 1922) (PILSBRY, 1940). These specimens average 8.8 mm (8.5–9.0 mm) in diameter, 5.3 mm (5.0–6.0 mm) in height, and have 5–5½ whorls. Specimens from coastal sites, by contrast, bear many fine, close-set hairs. Many specimens are only minutely perforate, and the parietal tooth is well-developed; lip teeth are sometimes lacking. Shells from coastal areas average 9.1 mm (7.7–11.0 mm), 6.3 mm (5.5–7.5 mm) in height, and have 4¾–5½ whorls. Specimens from inland sites, such as those from headwater sections of the Umpqua River (Station 78), average somewhat larger, 11.6 mm (10.2–13.0 mm) in diameter, 7.4 mm (7.0–8.5 mm) in height, with 5½–6 whorls.

Vespericola columbiana (Lea, 1838)

Collections: 6 (3), 10 (7), 12 (4), 13 (6), 15 (4), 16 (5), 17 (3), 19 (8), 20 (2), 21 (1), 22 (13), 23 (1), 24 (9), 27 (3), 29 (4), 31 (1), 33 (5), 34 (3), 36 (1), 37 (1), 38 (3), 39 (1), 41 (8), 43 (1), 44 (11), 47 (2), 49 (1), 50 (3), 55 (3), 57 (1), 58 (1), 61 (1), 63 (1), 64 (1), 69 (1), 70 (1), 72 (4), 73 (1), 74 (4), 77 (2), 78 (5), 79 (2), 81 (3), 82 (3).

This is one of the most widely distributed species of land snails in the Pacific northwest (B. A. BRANSON, 1977, 1980; PILSBRY, 1940; HENDERSON, 1929, 1936), particularly in Oregon west of the Cascade Crest. In Oregon, it is also a rather variable species as one progresses inland, although in the Coast Range and on the western slopes of the Cascades most specimens are readily assignable to *V. columbiana pilosa* (Henderson, 1928). Specimens from inland sites tend to be slightly larger in diameter. Average measurements for mature shells secured along the coast are: 13.7 mm (11.2–17.5 mm) in diameter, 9.2 mm (7.5–11.5 mm) in height, with 5½–6½ whorls. A few of these shells lack apertural teeth. At inland sites (Stations 55, 61, 73–74, 78–79) average measurements were: 16.0 mm (14.0–18.0 mm) in diameter, 11.1 mm (10.0–12.2 mm) in height, with 5¾–6½ whorls. These latter shells tend to be less hirsute than ones from coastal areas.

Specimens from the Columbia River gorge, from the relatively dry habitats in Mount Hood National Forest along the Hood River in Multnomah County, and from sites along the Clackamas River in Clackamas County differ considerably from those discussed above. Although partially covered by a columellar reflection of the lip, the umbilicus is obviously enlarged, 13–15% of the total diameter of the shell. The reflected, white peristome is wide and nearly flat, and the aperture, mostly because of the angular periphery, has a shape reminiscent of that seen in some depressed forms of *Monadenia*, i.e., it is elongated horizontally. The matt shell surface bears very short, stiff and sparse periostracal processes, spirally arranged on the base. Average measurements of mature shells are: 16.5 mm (15.0–18.5 mm) in diameter, 11.1 mm (10.5–11.5 mm) in height, with 5¾–6½ whorls. This is probably the

form PILSBRY (1940) referred to *V. columbiana latilabrum* Pilsbry, 1940. The marked differences in the shells suggest that *latilabrum* probably deserves full-species designation, but that will have to be verified by careful analysis of the genital anatomy.

Trilobopsis loricata nortensis (Berry, 1933)

Collections: 10 (1).

HAAS (1954) indicated that his collection of two specimens from the redwoods west of the Hiouchi Bridge was the first record for this subspecies since the original description. HENDERSON (1936) did not collect it but discussed ANDRUS' (1897) report from Douglas County, Oregon, under the epithet *T. loricata loricata*. PILSBRY (1940) stated that he was "temporarily referring Andrus specimens to *T. l. nortensis*." Thus, the single specimen reported here appears to be the first verified report of the species in Oregon since 1897.

The collecting locality is, of course, very similar to the type locality in Del Norte County, California, including the presence of Coast redwoods. The upper surface of the shell bears strong spiral sculpture crossed by moderately strong radial sculpture. The base is marked by well-developed spiral sculpture, and there is a plethora of raised, crescent-shaped tubercles. There are two widely spaced lip teeth and a relatively large, white and slightly sinuous parietal tooth. *Trilobopsis loricata nortensis* probably deserves full-species recognition, but this needs to be verified by features of the soft anatomy.

HAPLOTREMATIDAE

Haplotrema vancouverensis (Lea, 1839)

Collections: 10 (3), 11 (2), 12 (7), 14 (4), 15 (3), 16 (3), 17 (7), 22 (5), 23 (2), 25 (3), 26 (1), 27 (3), 29 (6), 37 (1), 38 (5), 39 (2), 42 (2), 44 (1), 45 (2), 47 (4), 53 (1), 57 (1), 58 (1), 60 (1), 61 (1), 62 (2), 63 (3), 69 (1), 72 (4), 73 (1), 77 (2), 79 (2), 82 (1).

Haplotrema sportella (Gould, 1846)

Collections: 11 (2), 12 (1), 13 (11), 15 (7), 16 (1), 17 (7), 19 (1), 21 (1), 22 (11), 24 (3), 26 (1), 27 (7), 29 (4), 30 (3), 33 (2), 34 (2), 37 (1), 41 (10), 42 (2), 44 (16), 45 (7), 47 (6), 48 (1), 52 (2), 53 (1), 56 (1), 57 (4), 58 (1), 59 (2), 61 (2), 72 (4), 74 (6), 76 (2), 77 (2), 78 (1), 80 (2).

As stated previously (B. A. BRANSON, 1977), *H. sportella* seems to be a complex of at least two species. The whole west coast complex is in need of revision, utilizing detailed anatomical features and, perhaps, the results of electrophoretic analysis.

Specimens from Benton County, Oregon (Station 30) are much greener than ones from most other localities, and the shell is very solid, mostly because of a thick pearly layer within.

Haplotrema sp.

Collections: 9 (2).

These shells, 19.0 mm in diameter, are palish green in

color and are very smooth. The aperture is nearly transverse. In general configuration, they are strongly reminiscent of *H. keepi* (Hemphill, 1890) from Redding in Shasta County, California. Additional collecting at this locality, which is at the California border, is required before specific diagnosis can be attempted.

ZONITIDAE

Representatives of six genera and nine species were collected.

Euconulus fulvus (Müller, 1774)

Collections: 3 (4).

These shells measured 3.0–3.2 mm in diameter and had 5–5+ whorls.

Nesovitrea binneyana occidentalis (H. B. Baker, 1930)

Collections: 41 (3).

These specimens were living in hardwood leaf litter on sandy soil.

Pristiloma cf. chersinella (Dall, 1886)

Collections: 17 (1).

The single waxen-white specimen, measuring 2.0 mm in diameter with three whorls, seems closer to *P. chersinella* than to any other *Pristiloma*. This species was previously reported from the vicinity of Upper Klamath Lake in Oregon (BAKER, 1931; HENDERSON, 1936). However, *P. wascoense* (Hemphill, 1911) is also known from Oregon near Salem (BAKER, 1931) and the Willamette Valley (PILSBRY, 1946), although we were unable to recognize that species in our collections.

Pristiloma lansingi (Bland, 1875)

Collections: 13 (1), 41 (4), 47 (2), 77 (5).

The imperforate shells are pale amber in coloration and are transparent. Growth striae are nearly lacking. A very low but well-developed denticulate ridge occurs immediately inside the aperture on the lower and middle lip. The shells measure 2.0–2.5 mm in diameter and have 4½–5½ whorls. PILSBRY (1946) and HENDERSON (1929) presented additional localities in Oregon.

Pristiloma johnsoni (Dall, 1895)

Collections: 13 (1), 23 (1), 48 (1), 75 (1), 78 (1).

The last whorl in these waxen-white shells is nearly twice as wide as the preceding one and the spire is strongly depressed. Measurements: 2.4–2.8 mm in diameter, with 3½ whorls.

Zonitoides arboreus (Say, 1816)

Collections: 74 (1), 78 (1).

Zonitoides arboreus is not a particularly common species in the Pacific northwest, although it is apparently locally abundant in the mountains farther east (B. A. BRANSON, 1977). The two specimens reported here measure 3.0–4.3 mm in diameter and have 3½–4+ whorls.

Zonitoides nitidus (Müller, 1774)

Collections: 5 (1).

There are few records for this snail on the west coast. In Oregon, it was known previously from Astoria (PILSBRY, 1946).

Striatura pugetensis (Dall, 1895)

Collections: 17 (1), 41 (2), 58 (1).

There are few published records for this minute species in Oregon. PILSBRY (1946) recorded it from Clackamas, Clatsop, Klamath, and Multnomah counties, and HENDERSON (1929, 1936) from Springfield and Elkhorn, Oregon. Our specimens measured 1.2–1.6 mm in diameter and were less than 0.5 mm in height; there are 2¾–3¼ whorls.

Vitrina alaskana (Dall, 1905)

Collections: 1 (5), 2 (3), 7 (3), 66 (1).

All of our specimens were found east of the Cascade Crest in very dry habitats, mostly under basaltic rocks. All represent new distribution records within Oregon; the previous reports are from Willamette, Umatilla, and Klamath counties (PILSBRY, 1946), all of which are also dry habitats.

TESTACELLIDAE

Testacella haliotidea Draparnaud, an agnathous shell-bearing slug from western Europe (PILSBRY, 1946), was reported from greenhouses in Clackamas County (BRUCE, 1950) and Salem and Corvallis, Oregon (HANNA, 1966).

ENDODONTIDAE

Punctum randolphi (Dall, 1895)

Collections: 66 (1).

This locality, a new distributional record in Oregon, lies east of the Cascade Crest in very dry country. However, the specimen was removed from moist, decaying wood on the banks of Tumalo Creek. All other published Oregon records are from west of the Cascade Crest (PILSBRY, 1948).

LIMACIDAE

In addition to the species reported here, PILSBRY (1948) reported *Limax maximus* Linnaeus from Salem and *Milax gagates* (Draparnaud) from Clackamas, Benton and Douglas counties.

Deroceras reticulatum (Müller, 1774)

Collections: 7 (1), 66 (1).

Both individuals are more or less typical specimens, and both were taken from areas with a history of recent human disturbance. Several coastal and Columbia River sites were given by PILSBRY (1948). This species is a rather serious pest in Oregon strawberry and truck crops (CAPIZZI, 1960a) and grains (CAPIZZI, 1961).

Deroceras laeve (Müller, 1774)

Collections: 4 (5).

This site is a very dry pine forest near Klamath Lake, a rather unusual habitat for this slug.

PUPILLIDAE

As pointed out many years ago (HENDERSON, 1929), the family Pupillidae is rare to uncommon in the Pacific northwest. Although we searched diligently in many habitats at all elevations from sea level to the Cascade Crest and at and above timberline on the high volcanoes, we were unable to secure representatives of the family.

VALLONIIDAE

Vallonia cyclophorella Sterki, 1892

Collections: 1 (83), 3 (3), 4 (15).

Although a common species on the lee side of the mountains, *V. cyclophorella* appears to be very scarce or even lacking west of the Cascade Crest in Oregon. Measurements: 2.7–3.0 mm in diameter; whorls 3½–3¾.

ARIONIDAE

Although HANNA (1966) indicated that *Arion fasciatus* Nilsson was common in the vicinity of Corvallis we did not secure specimens in that area.

Arion ater (Linnaeus, 1758)

Collections: 19 (3), 20 (1), 21 (4), 31 (6), 32 (3), 35 (1), 36 (4), 41 (5), 47 (1).

These numbers are, of course, in no manner representative of population sizes. Whenever encountered, *A. ater* was always present in enormous numbers, often at destructive levels, as also was reported by CAPIZZI (1960b). At Stations 31 and 32, thousands of individuals per hectare were observed, principally at dusk and after sunset; *A. ater* is principally a nocturnal slug (LEWIS, 1969). As far as we can tell, REHDER (1947) was first to report this European exotic from Oregon.

Arion hortensis (Férussac, 1819)

Collections: 32 (8), 41 (2).

This slug, another European exotic, apparently has not heretofore been reported from Oregon. This diagnosis should be substantiated.

Prophysaon andersoni (J. G. Cooper, 1872)

Collections: 9 (2), 13 (1), 15 (1), 17 (4), 18 (1), 19 (2), 26 (1), 32 (2), 36(2), 41 (5), 51 (2), 52 (1), 53 (2), 54 (2), 59 (1), 63 (4), 64 (2), 65 (3), 67 (4), 68 (1), 72 (2), 77 (1), 78 (3), 79 (4), 80 (1).

This handsome little slug is more widely distributed in Oregon than any other member of the genus, often being collected with *P. caeruleum* at 1500 m elevation or above. A favored habitat is decaying logs and standing stumps.

Prophysaon foliolatum (Gould, 1851)

Collections: 14 (1), 42 (4).

These are the only published records for this slug from Oregon. Although both collecting sites are worthy of note, the Humbug Mountain station is of particular interest because of its distance from the principal center of distribution.

Prophysaon caeruleum Cockerell, 1890

Collections: 59 (1), 60 (1), 63 (1), 75 (1), 76 (1), 81 (1).

Known previously only from localities in Portland, Oswego, and Corvallis (PILSBRY, 1948), this bright-blue to bluish-gray slug is one of formidable habitats. We took specimens from high woodlands where the snow lingers well into July. It is also one of the few slugs encountered in dry, volcanic areas such as those at the Diamond Peak Wilderness (Station 75) and the Rogue River National Forest (Station 81).

Prophysaon dubium Cockerell, 1890

Collections: 7 (1).

In life, this specimen was dark bluish-gray above, and the narrow, rugose, undivided sole was grayish-white. The mantle, the same color as the body with three indistinct, blackish, chevron-like marks at the anterior end, is smooth above, but bears very small papillae on the sides. The body tapers posteriad, and bears deep, longitudinal grooves; shallow, transverse grooves periodically cut across the longitudinal ones. There is no mucous pore. Preserved measurements are: total length—16.0 mm; mantle length—6.0 mm.

The only previous records for the species in Oregon are from Portland, Oswego, and Corvallis (PILSBRY, 1948), and "Oregon" (WEBB, 1961).

Prophysaon vanattae Pilsbry, 1948

Collections: 50 (2), 52 (2), 57 (3), 59 (1), 61 (8).

Apparently restricted in distribution to northwestern Oregon and Washington, this slug is often confused with *P. fasciatum*. The red phase discussed by PILSBRY (1948) and B. A. BRANSON (1980) is rare to lacking in most of the Oregon range, most of the specimens being similar to those from the Olympic Peninsula (B. A. BRANSON, 1977). Individuals from the population on and near Mount Hood are often nearly black, other color-pattern elements being obscured.

Prophysaon fasciatum Cockerell, 1890

Collections: 44 (1), 62 (1).

These two specimens are of the kind referred to as *P. f. obscurum* Cockerell by PILSBRY (1948), who stated that the northern race (Washington) was probably a distinct species, based upon genital differences. These are the first published records for Oregon.

Hesperarion species

Collections: 38 (2).

Prior to this report, the genus *Hesperarion* was thought to be restricted in distribution to California around and south of San Francisco (GREGG, 1961; MEAD, 1943; PILSBRY, 1948) and Tehama County (LANGE, 1944). Our record represents a significant range extension for the genus.

This apparently unknown slug species differs from all other members of the genus *Hesperarion* by characters of the genitalia and features of the body sculpturing on the

head and body, by the raised hump-like area beneath the mantle, and by color pattern. It is most closely related to *H. hemphilli* (W. G. Binney) but differs from that species in the decidedly reddish pigmentation, in having the black spots of the body arranged in a definite pattern and rows, in having a larger caudal pit with a down-turned ventral portion, and in possessing a massive triangular and constricted penis. Additional differentiating features will probably be discovered in the radula, genitalia, and musculature when additional specimens become available. A voucher specimen was deposited at the Field Museum of Natural History (FMNH 198763) in Chicago.

Hemphillia malonei (Pilsbry, 1917)

Collections: 42 (2), 51 (1), 53 (9).

This species appears to be restricted to the Columbia River gorge and Mount Hood regions of Oregon. Previous distribution records (Clackamas, Multnomah, and Hood River counties) were given by KOZLOFF & VANCE (1958).

Hemphillia cf. burringtoni (Pilsbry, 1948)

Collections: 39 (1 immature).

This specimen is indistinguishable from specimens secured from the Olympic Peninsula. However, the area needs to be more thoroughly searched for mature specimens before this species is definitely added to the Oregon fauna.

Ariolimax columbianus (Gould, 1851)

Collections: 10 (1), 13 (2), 16 (1), 17 (2), 18 (1), 19 (3), 20 (1), 21 (3), 22 (5), 23 (1), 24 (4), 25 (1), 26 (1), 28 (1), 29 (2), 30 (1), 31 (2), 34 (2), 35 (1), 36 (1), 38 (2), 39 (1), 40 (1), 42 (4), 44 (1), 45 (1), 47 (1), 48 (1), 62 (1), 68 (1), 70 (1), 71 (1), 73 (2), 76 (2), 77 (1), 78 (3).

Although both maculated and spotless color morphs occur throughout the range of this widespread slug, Oregonian populations appear to be less variable than those farther north in Washington and on the Olympic Peninsula (B. A. BRANSON, 1977). MEAD (1943) provided a detailed discussion of the genus *Ariolimax*.

ACKNOWLEDGMENTS

We greatly appreciate the fine cooperation and assistance of Mr. Mark E. Forbes, Resource Management Specialist, during our collecting attempts at Crater Lake National Park. Mr. T. Edwin Cummings, Staff Fish Biologist, Department of Fish and Wildlife, Portland, Oregon, provided us with instructions regarding state regulations, and Mr. Tony Skufca, Director of Recreation, Region 6, U.S. Forest Service, Portland, Oregon, provided us permission for our work in his district. Finally, Mary Louise Branson, wife of the senior author, accompanied us throughout the entire excursion.

LITERATURE CITED

ANDRUS, F. H. 1897. Notes on the land shells of Douglas County, Oregon. *Oregon Natur.* 4:53-54.

- BAKER, H. B. 1931. Nearctic vitreine land snails. *Proc. Acad. Natur. Sci. Phila.* 83:85-117.
- BRANSON, B. A. 1977. Freshwater and terrestrial Mollusca of the Olympic Peninsula, Washington. *Veliger* 19:310-330.
- BRANSON, B. A. 1980. Collections of gastropods from the Cascade Mountains of Washington. *Veliger* 23:171-176.
- BRANSON, B. A. & D. H. BARRETT. 1981. Analysis of some characteristics in twenty-four populations of western U.S. pleurocerid snails. *Nautilus* 95:14-19.
- BRANSON, R. MACG. 1983. Geographic variation of banding and color morphs in *Monadenia fidelis* (Gray 1834). *Veliger* 25:349-355.
- BRUCE, L. C. 1950. *Testacella haliotide* in Clackamas County, Oregon. *Nautilus* 64:59.
- BURCH, J. B. 1982. Freshwater snails (Mollusca: Gastropoda) of North America. EPA-600/3-82-026:i-vi, 1-294.
- BURCH, J. B. & J. L. TOTENHAM. 1980. North American freshwater snails. Species list, ranges and illustrations. *Trans. Poets Soc.* 3:81-215.
- CAPIZZI, J. 1960a. *Deroceras reticulatum* heavily damaging strawberries, cauliflower and seedling truck crops in Willamette Valley, Oregon. *Coop. Econ. Insect Rep.* 10:466.
- CAPIZZI, J. 1960b. *Arion ater* damaging vegetables and flower gardens in Tillamook County, Oregon. *Coop. Econ. Insect Rep.* 10:809.
- CAPIZZI, J. 1961. *Deroceras reticulatum* damaging grain fields in Marion County, Oregon. *Coop. Econ. Insect Rep.* 11:67.
- COOPER, W. 1860. Report upon the Mollusca collected on the survey. U. S. P. R. R. Surv. 36th Congress Exec. Doc. 56 XII (II):369-386.
- DETILING, L. E. 1966. The flora of the Columbia River Gorge. *Northwest Sci.* 40:133-137.
- GREGG, W. O. 1961. Southern California slugs, additional locality records. *Nautilus* 75:84-85.
- GOODRICH, C. 1942. The Pleuroceridae of the Pacific Coastal drainage, including the Western Interior Basin. *Occ. Pap. Mus. Zool. Univ. Mich.* 469:1-4.
- HAAS, F. 1954. Non-marine mollusks from the Pacific slope of North America. *Nautilus* 67:94-96.
- HANNA, G. D. 1966. Introduced mollusks of western North America. *Occ. Pap. Calif. Acad. Sci.* 48:1-108.
- HENDERSON, J. 1929. Non-marine Mollusca of Oregon and Washington. *Univ. Colo. Stud.* 17:47-190.
- HENDERSON, J. 1935a. West American species of *Goniobasis* with descriptions of new forms. *Nautilus* 48:94-99.
- HENDERSON, J. 1935b. West American species of *Goniobasis* with descriptions of new forms. *Nautilus* 48:130-134.
- HENDERSON, J. 1936. The non-marine Mollusca of Oregon and Washington—supplement. *Univ. Colo. Stud.* 23:251-280.
- HUBENDICK, B. 1978. Systematics and comparative morphology of the Basommatophora. Pp. 1-47. *In*: V. Fretter & J. Peake (eds.), *Pulmonates*. Academic Press: New York. 540 pp.
- KOZLOFF, E. N. & J. VANCE. 1958. Systematic status of *Hemphillia malonei*. *Nautilus* 72:42-49.
- LANGE, W. H. 1944. Land slugs in California. *Bull. So. Calif. Acad. Sci.* 43:33-40.
- LAWRENCE, D. B. 1939. Some features of the vegetation of the Columbia River Gorge with special reference to asymmetry in forest trees. *Ecol. Monogr.* 9:217-257.
- LEWIS, R. D. 1969. Studies on the locomotor activity of the slug *Arion ater* (Linnaeus). 1. Humidity, temperature and light reactions. *Malacologia* 7:295-306.
- LYNOTT, R. E. 1966. Weather and climate of the Columbia gorge. *Northwest Sci.* 40:129-132.

- MEAD, A. R. 1943. Revision of the giant west coast land slugs of the genus *Ariolimax* March (Pulmonata:Arionidae). Amer. Midl. Natur. 30:675-717.
- PILSBRY, H. A. 1939. Land Mollusca of North America (north of Mexico). Acad. Natur. Sci. Phila. Monogr. 3, 1(1):i-xvii, 1-573.
- PILSBRY, H. A. 1940. Land mollusca of North America (north of Mexico). Acad. Natur. Sci. Phila. Monogr. 3, 1(2):i-vii, 575-994.
- PILSBRY, H. A. 1946. Land Mollusca of North America (north of Mexico). Acad. Natur. Sci. Phila. Monogr. 3, 2(1):i-vi, 1-520.
- PILSBRY, H. A. 1948. Land Mollusca of North America (north of Mexico). Acad. Natur. Sci. Phila. Monogr. 3(II)2:i-xlvi, 521-1113.
- REHDER, H. A. 1947. *Arion ater* (L.) in Oregon. Nautilus 61: 70.
- ROTH, B. 1981. Shell color and banding variation in two coastal colonies of *Monadenia fidelis* (Gray) (Gastropoda:Pulmonata). Wasmann J. Biol. 38:39-51.
- TAYLOR, D. W. 1966. A remarkable snail fauna from Coahuila, Mexico. Veliger 9:152-228.
- WALTON, M. L. 1970. Longevity in *Ashmunella*, *Monadenia* and *Sonorella*. Nautilus 83:109-112.
- WEBB, G. R. 1961. The phylogeny of American land snails with emphasis on the Polygyridae, Arionidae and Ammonitellidae. Gastropodia 1:31-44; 44-52.